THE HORSE

PAST AND PRESENT

IN THE

AMERICAN MUSEUM OF NATURAL HISTORY

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BY

HENRY FAIRFIELD OSBORN

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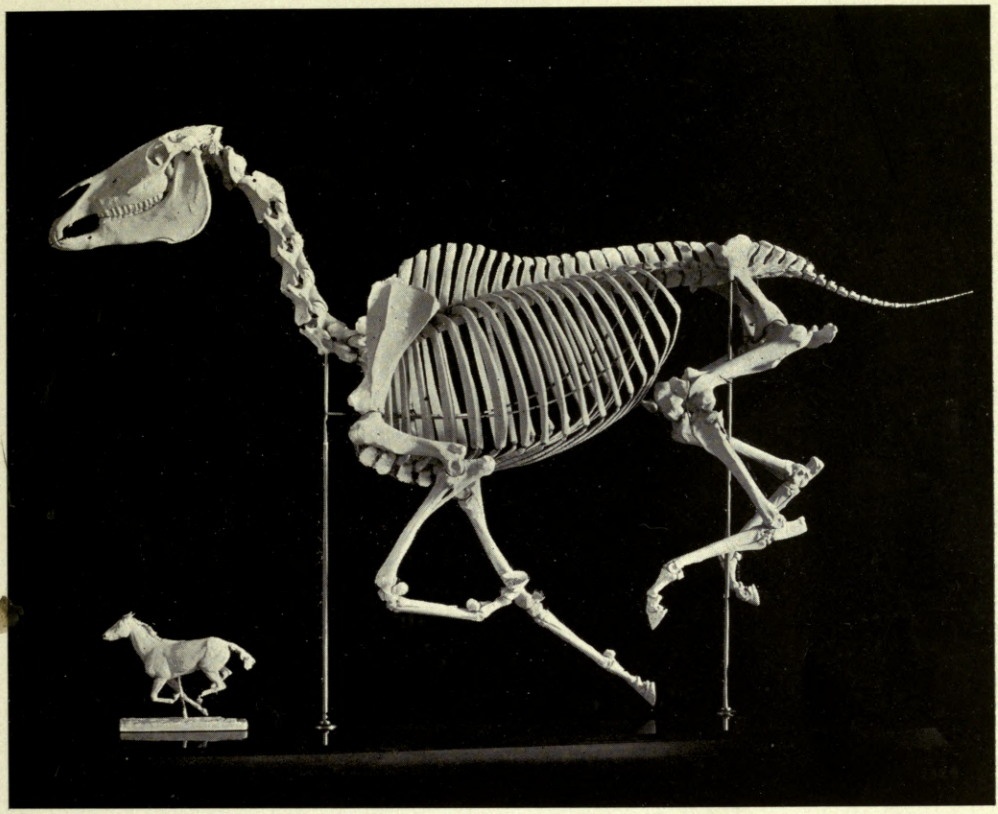

IN THE

AMERICAN MUSEUM OF NATURAL
HISTORY AND IN THE
ZOOLOGICAL PARK

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THE HORSE: PAST AND PRESENT

In 1891 the American Museum began its long series of explorations and studies upon the evolution of the horse. It now contains the most complete collection of fossil horses in the world; also a very remarkable collection of mounted skeletons and models of modern horses, including both wild and domestic breeds.

The ancestry of the horse has been traced back through successive stages represented by fossil skeletons to small progenitors with four toes on the fore feet and three on the hind feet, with short-crowned, simple teeth and small brain, but always possessed of great relative speed.

What may be called the fossil breeds are found to be specialized as are modern breeds into exceedingly swift running as well as into slow-moving types, into giant horses exceeding the very largest existing percherons, and into diminutive horses smaller even than the most diminutive shetland. The comparison of fossil and living types is therefore most interesting and instructive.

An epitome of the transformation of the hind leg from the hock joint down shows the gradual increase in size of the median hoof and the consequent diminution of the side hoofs which are slowly raised above the ground through a very long period, hanging at the sides as dew claws but finally withdrawn up the sides of the cannon bone as the "splints."

The first important step in this collection was in 1894 when the very ancient four-toed horse of the Wind River mountains (*Eohippus venticolus*) was presented by Mr. Cornelius Vanderbilt and others.

In 1900–1903, three annual expeditions were fitted out on a generous scale especially to collect the ancestors of the horse; this was

through the gift of Mr. William C. Whitney, also a Trustee of the Museum. These expeditions were successful in securing several complete three-toed horses.

The direct ancestor of the modern horse is still to be discovered; it is the one link still missing. The Museum is planning for continued search in the West, especially in Texas, South Dakota, and Nebraska, where it is hoped this link may be discovered. It is also preparing to publish a full history of the horse from the earliest times to the present.

GENERAL CONTRIBUTORS

Among the present and former contributors to the American Museum explorations and collections showing the history of this noblest of living quadrupeds are the following:

Cornelius Vanderbilt	in the year	1894
William C. Whitney	in the years	1900, 1902, 1903
Henry Fairfield Osborn	" " "	1891-1912
Arthur Curtiss James	" " "	1906, 1907
Cleveland H. Dodge	in the year	1909
George J. Gould	in the years	1906-1909
Frank K. Sturgis	" " "	1907-1913
Percy R. Pyne	in the year	1906
J. Pierpont Morgan	in the years	1904-1913

donor of models, restorations and illustrations of extinct horses.

SPECIAL CONTRIBUTORS OF RECENT HORSES

James R. Keene . . . . in the year 1906
donor of the skeleton and cost of mounting of "Sysonby."

Randolph Huntington . . in the year 1904
donor of the skeleton of the Arab "Nimr."

His Grace the Duke of Bedford, in the year 1912
donor of the skeletons of two wild or Przevalski horses from his herd at Woburn, England.

Sir Wilfred Lawson Blunt . in the year 1907
donor of skull of an Arab.

George Ehret . . . . in the year 1901
skeleton of the Draught Horse.

Zoological Society of New York
skeletons of Zebras and
Wild Asses . . in the years 1906, 1911, 1912

Warren Delano . . " " " 1912, 1913
Gift of a Norwegian Pony, and of a Hinny, or hybrid between stallion and ass.

The following persons have also contributed from time to time to the growth of the collection:

Watson B. Dickerman

E. B. Southwick

Homer Davenport

Thomas F. White Company

Grant Stringer

TYPES OF MODERN HORSES

The collection of types of modern horses is designed to show, first, the highest standards produced by breeding; second, the mechanical perfection of the skeleton of the horse in the various extremes of motion and action, chiefly as studied through instantaneous photography. Mr. S. H. Chubb has been in charge of the preparation of this series since 1901, and has reached a standard of truth and artistic perfection never before attained.

The domesticated types which have already been completed or planned are the following:

The Arab, source of all the Thoroughbred Stock

The Rearing Horse in comparison with the Skeleton of Man

The Draught Horse in the Act of Pulling a Heavy Load

The Race Horse, typified by "Sysonby" at Full Speed

The Standing Pose, typified by a Giant Horse of the Percheron breed from Ohio, in standing position

The Grazing Pose, typified by the Diminutive Shetland "Highland Chieftain"

The Trotting Horse, to be represented by such a type as "Lou Dillon"

It is proposed to complete this series by the addition of mounted skeletons of the following types of wild horses, asses, and zebras.

The Przewalsky Horse, from the Desert of Gobi, the only existing species of Wild Horse

The Grevy's Zebra, from Abyssinia

The Mountain Zebra, from South Africa

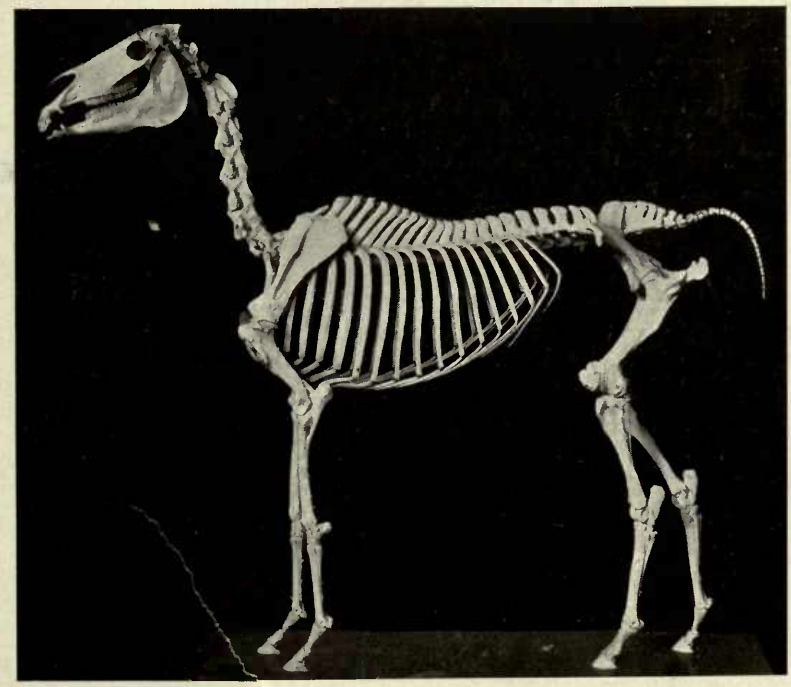
The Burchell or Grant Zebra, from Central Africa

The Wild Ass (Progenitor of the Domestic Ass), from Abyssinia

The Kiang or Asiatic Ass, from Central Asia

THE ARAB

The Arab is famous both in itself and as the chief source from which the English thoroughbred was derived through the "Byerley Turk" and the "Darley Arabian." All the fineness and all the quality of modern horses are derived from this ancestral Arab strain, although the thoroughbred was largely modified originally by crossing of other stocks.



ARABIAN STALLION "NIMR" IN POSE OF WATCHING A HERD

The skeleton of "Nimr" was presented by Mr. Randolph Huntington, Oyster Bay, L. I., February, 1904, and mounted by Mr. S. H. Chubb in 1906. "Nimr" was a pure-bred Arabian stallion, sired by the desert-bred Arabian "Kismet," a horse celebrated for an unbroken record of victories as a race horse in India. The skeleton of "Kismet" was preserved for some time by a New York veterinarian but was unfortunately destroyed.

In the skeleton of the Arab both the head and tail are carried high when the animal is animated, and in this mount of "Nimr" all the special Arab characters may be observed as follows:

1. Skull short, but broad between the eye sockets.

2. Eye sockets high and prominent, giving the eyes a wide range of vision.

3. Facial profile, or forehead, concave.

4. Jaw slender in front, deep and wide set above the throat.

5. Round-ribbed chest, short back with only five [ribless or] lumbar vertebræ, well "ribbed up."

6. A horizontally placed pelvis (a speed character) and a very high tail region, with few tail vertebræ.

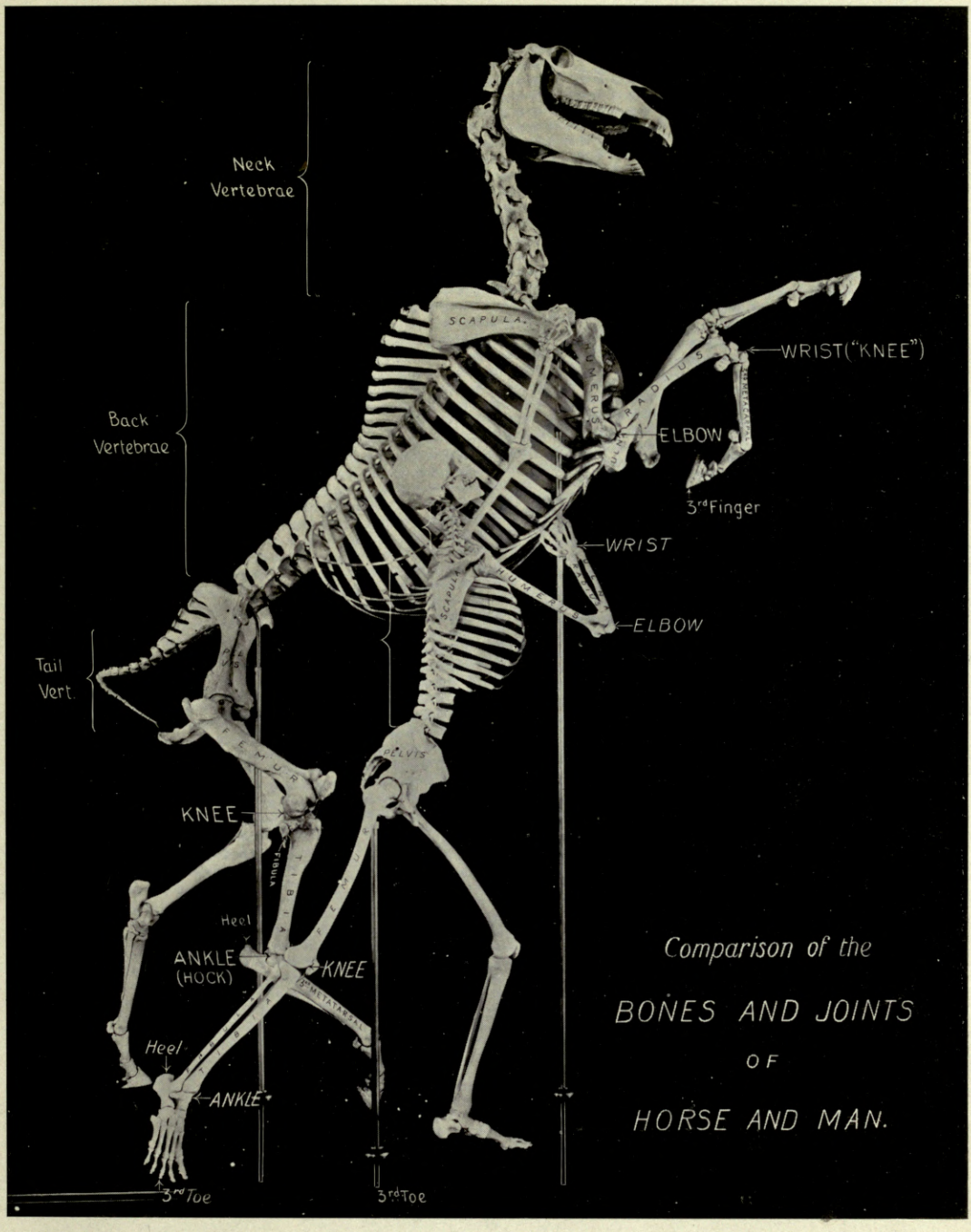
7. A complete shaft of the ulna, or small bone of the forearm.

8. Long and slender cannon bones, and long, sloping pasterns.

THE REARING HORSE IN COMPARISON WITH THE SKELETON OF MAN

The "breaking of the horse" by man about 15,000 years ago was a turning point in human history, and the adoption of the horse as a means of transportation, as an aid in agriculture, and as a fighting animal in war, have been factors of the greatest importance in the evolution of the human race.

This splendid mount is part of the gift of the late William C. Whitney. The mount is faithfully worked out from instantaneous photographs,



THE BREAKING OF THE HORSE

SKELETON OF THE HORSE AND OF MAN PLACED IN A SIMILAR POSITION FOR COMPARISON

and is suggestive of the BREAKING AND TRAINING OF THE HORSE BY MAN. The rearing action expresses unwilling subjection, and the position of man—as if holding a bridle—of intelligent control.

These two skeletons are so mounted by Mr. Chubb under Professor Osborn's direction as to facilitate comparison of the horse skeleton and the human skeleton, limb by limb, bone by bone. It will be observed that the left fore foot of the horse and the left arm of the man are extended forward and upward, while the right fore leg and the right arm are bent. Similarly, the right hind leg of the horse may be compared indirectly with the right leg of the man.

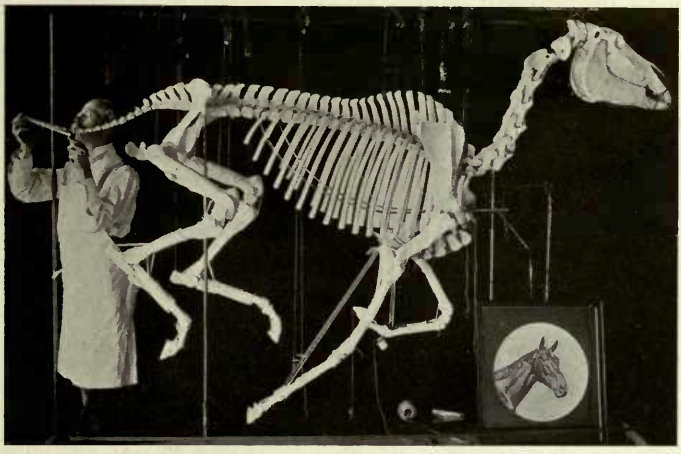
The human skeleton is that of a Prussian, selected for its fine proportions and exceptional height.

This mount is one of the greatest educational value and interest in the whole series.

THE RACE HORSE "SYSONBY"

"Sysonby" was one of America's most famous race horses. He was foaled February 7, 1902, at Mr. James R. Keene's Castleton stud in Kentucky, a few months after the importation from England of his dam, "Optime," his sire being the English bred "Melton." His record is one of the most brilliant in the history of American horse racing.

He won a remarkable series of victories between his first race at Brighton Beach, July 14, 1904, as a two-year old, and his untimely death at four years (June 17, 1906). The skeleton and its mounting was presented to the Museum by the late James R. Keene.



SKELETON OF "SYSONBY," PRESENTED BY JAMES R. KEENE BEING MOUNTED TO SHOW A PHASE IN THE STRIDE OF THE RUNNING HORSE

This mount is based on studies by S. H. Chubb made from direct observation and from the instantaneous photographs of Muybridge, Hemment and Chubb. The position is that taken the moment after the right fore foot has left the ground, and the right "knee," or carpus, is beginning to bend; the succeeding foot-falls in order are the left hind foot, the right hind foot, the left fore foot, and the right fore foot. The full length of one complete stride is about 26 feet.

SYSONBY.—*Motion of the Hip and Shoulder and Limbs.* At this instant the hind quarters and limbs are lifted perceptibly higher than the shoulders, and from a rear view it will be seen that while the hind feet are thrust forward at this great height from the ground, they are widely separated from each other so as to avoid striking the fore legs. A moment later the shoulders will be lifted by the push of the fore foot higher than the hind quarters, then the hind feet will move toward the median line and strike the ground and the fore feet will move forward out of the way of the hind.

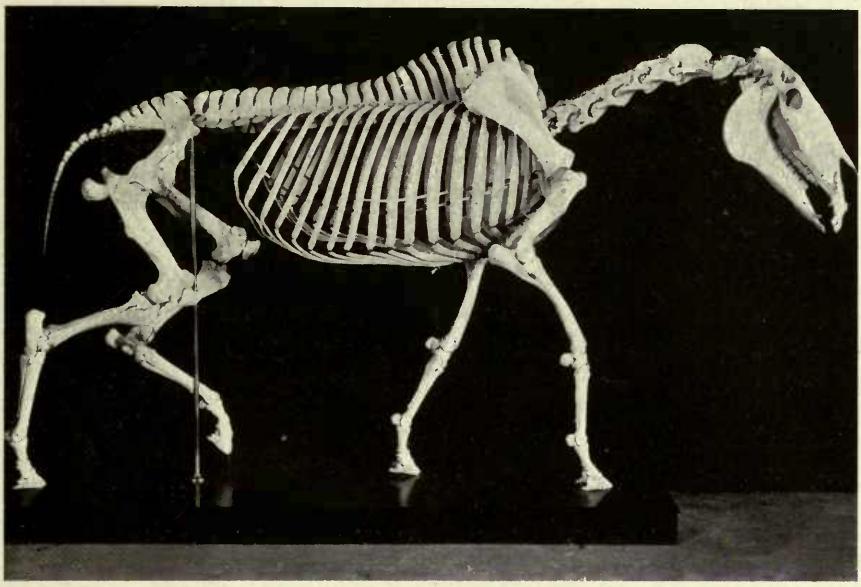
SYSONBY.—*Motion of the Back Bone.* The back bone is slightly arched to help draw together the fore and hind limbs and feet, and thus lengthen the stride and bring the back muscles into play. When viewed from above, the back bone is also observed to be curved a little to the right, owing to the forward position of the left hand side of the pelvis and of the left hind limb; this also lengthens and gives power to the stride as the back bone is straightened.

THE DRAUGHT HORSE

The horse of the Percheron breed from which this mount was made was presented to the Museum by Mr. George Ehret. The mounting was completed by Mr. S. H. Chubb in the laboratories of the Museum in the year 1903, from his own photographs and studies supplemented by the famous works of Muybridge. In direct contrast to the skeleton of "Sysonby," this animal was mounted in order to show the development of power and slow movement in the Percheron breed.

The skeleton has been so mounted as to show the position of the bones when the animal is drawing a heavy load. The visitor will imagine that the shoulders are thrust against a collar, upon which the horse is pushing with all its energy. Note that the head and body are

lowered, three of the feet are resting upon the ground. At the same time the hind limbs are doing the greater amount of work, the fore limbs acting chiefly as supports although entering into the thrust so far as possible; a portion of the weight of the body has been thrown into the collar. A feature which is not shown in this photograph is the curvature of the backbone under the strain.

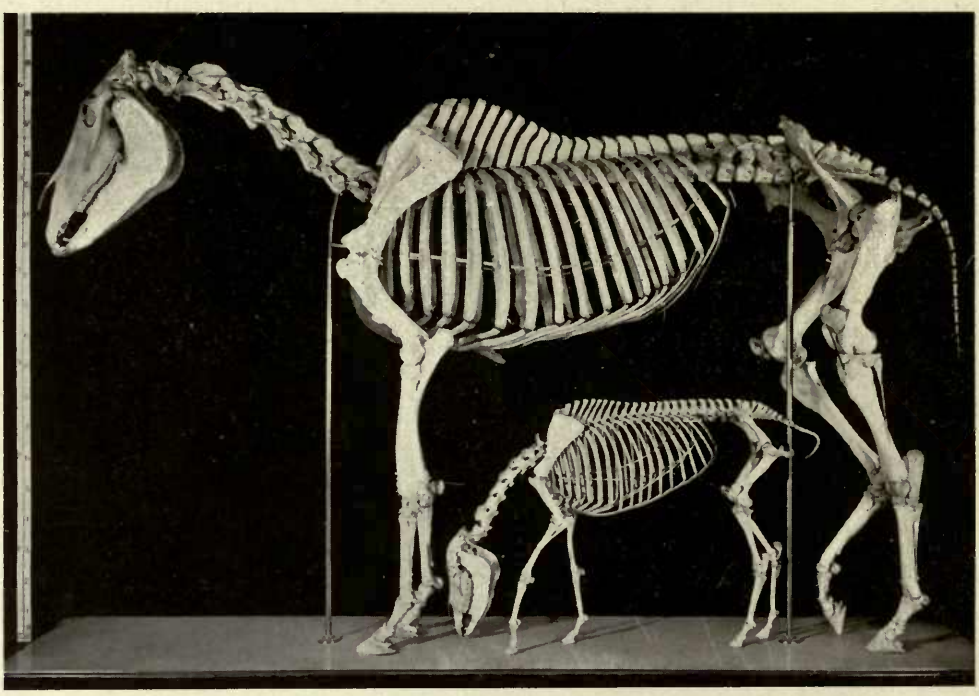


THE DRAUGHT HORSE IN ACTION
Mount, the Gift of William C. Whitney

GIANT DRAUGHT HORSE

The draught horse is derived from what is known as the Northern or Forest stock, a type of wild horse quite distinct from that which gave rise to the Arab and the Thoroughbred. The fertile fields and limestone soil of Kansas have exerted the remarkable influence on imported draught horses seen in the occasional appearance of giant horses arising as "sports," too large and clumsy for economic service.

This enormous animal may be contrasted with the most diminutive breed of modern horses, namely, the Shetlands, from an example especially bred and dwarfed for diminutive size.



GIANT DRAUGHT HORSE FROM OHIO AND
SHETLAND PONY OF SCOTLAND

These two skeletons, photographed together for purposes of comparison, show the extremes of size produced by breeding and the favorable or unfavorable action of climate which are to be compared with the extremes of speed shown in the Race Horse and Draught Horse.

The contrasts in size are as follows:

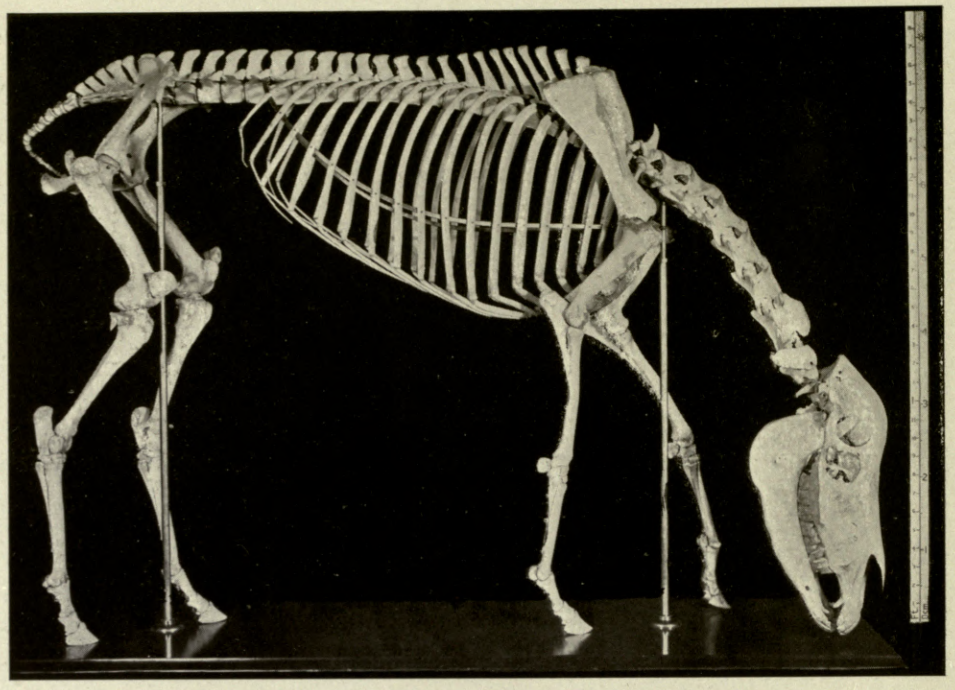
	GIANT DRAUGHT HORSE	SHETLAND PONY
Height at shoulders	6 ft. 1 in. (18¼ hands)	2 feet 9⅜ in. (8⅓ hands)
Weight in life	2,370 lbs.	170 lbs.
Bulk of femur (thigh-bone)	188 cu. in.	13½ cu. in.

The resting position chosen in 1909 for the mounting of the giant Draught Horse is one of inaction and is designed to show the relaxation of the body and the mechanical interlocking of the knee-cap in the left hind limb to release the muscles from the strain of the weight. This peculiar function of the patella (knee-cap) is shown in the left knee-joint, or stifle. While the joint is extended to support the animal's weight, the patella rests on the projecting process of the femur so that the knee is locked in the extended position by a very strong ligament which holds the patella a fixed distance from the tibia below, thus sustaining the weight required of it with comparatively little muscular exertion. Thus almost the entire weight of the hind quarters is supported on the extended left leg, while the right hind leg rests in a more flexed position and hangs perfectly lax. The pelvis also seems to hang, as it were, from the left hip joint, tilting very much to the right and twisting slightly the vertebral column.

SHETLAND IN GRAZING POSITION

This Shetland is a fully grown animal although the height at the shoulders is only 33⅜ inches. At the time the animal was purchased, in June, 1902, in Scotland, through the kindness of Professor J. Cossar Ewart of the University of Edinburgh, it was regarded as the most diminutive Shetland pony which had been bred in Great Britain. Somewhat smaller Shetlands have since been produced by selection and in-breeding.

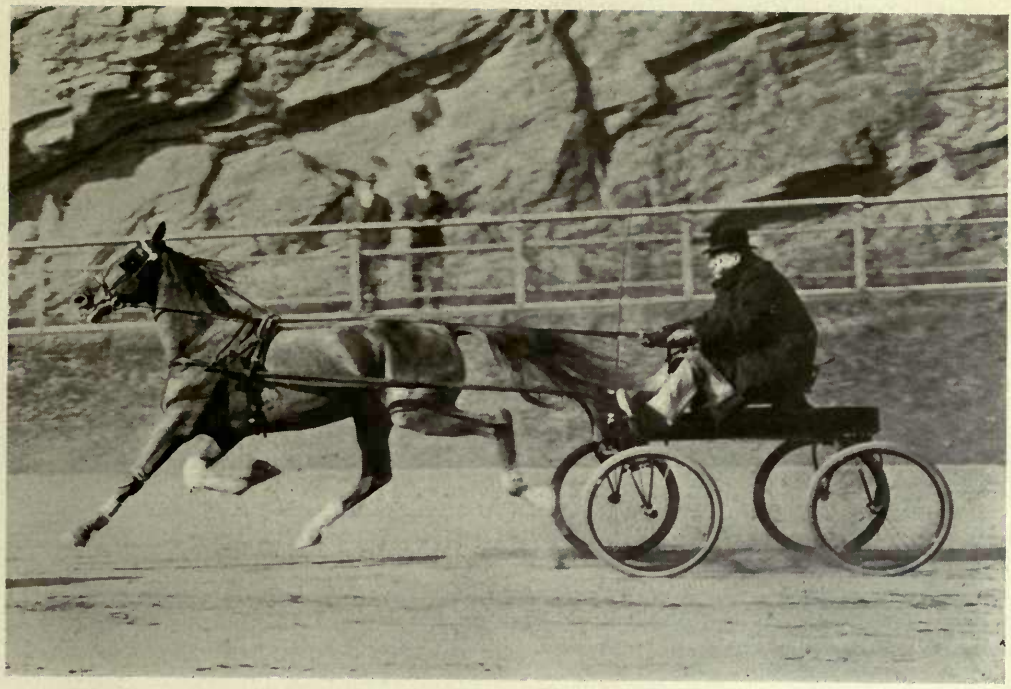
The modern Shetland pony has been produced by careful selection and breeding of a race of domestic or half wild horses originally dwarfed by unfavorable surroundings, inhabiting the bleak and barren Shetland Islands, with their cold, damp climate and restricted range. The Percheron, on the other hand, bred to the plow and cart in the rich and fertile lands of Normandy, has been improved by favorable conditions and by selection for size and strength, and is the largest of the domestic breeds of horses; the Shetland being the smallest.



SHETLAND PONY "HIGHLAND CHIEFTAIN" MOUNTED IN THE GRAZING POSITION

This skeleton was presented by William C. Whitney in June, 1902.

This special study shows the position of the limbs of a horse in the action of grazing. It will be seen that the downward reach of the head and the slow, lax step, modify the position of almost every bone in the body. The vertebral column is considerably arched in the dorsal region, thus assisting in the downward curve of the neck and at the same time tilting the angle of the pelvis a few degrees toward the perpendicular, increasing the length of the hind limbs and tilting the body toward the head. The head being turned well to the right, there is a very slight curve toward the left in the anterior portion of the dorsal vertebræ, and a slight curve to the right in the lumbar vertebræ owing to the backward position of the right hind foot. The weight of the body falls on the right front and the left hind foot, bringing them both very near the median line, and also modifying the position of the scapula and elevating the left side of the pelvis. A little below the knee a very small, hair-like bone may be seen, which represents the shaft of the almost extinct fibula.



THE TROTTING HORSE

Position Selected as Typical of the American Trotter, all four feet raised from the ground

THREE MODELS OF THE HORSE IN ACTION

These models, executed by Erwin S. Christman, one of the Museum's staff of artists, are designed to illustrate the action of the horse in the various phases of the walk, the gallop, and the trot, the latter still awaiting completion. The models are all to the same scale, of one sixth natural size, so that a contrast is afforded both of the differences of size and weight and the differences of proportion.

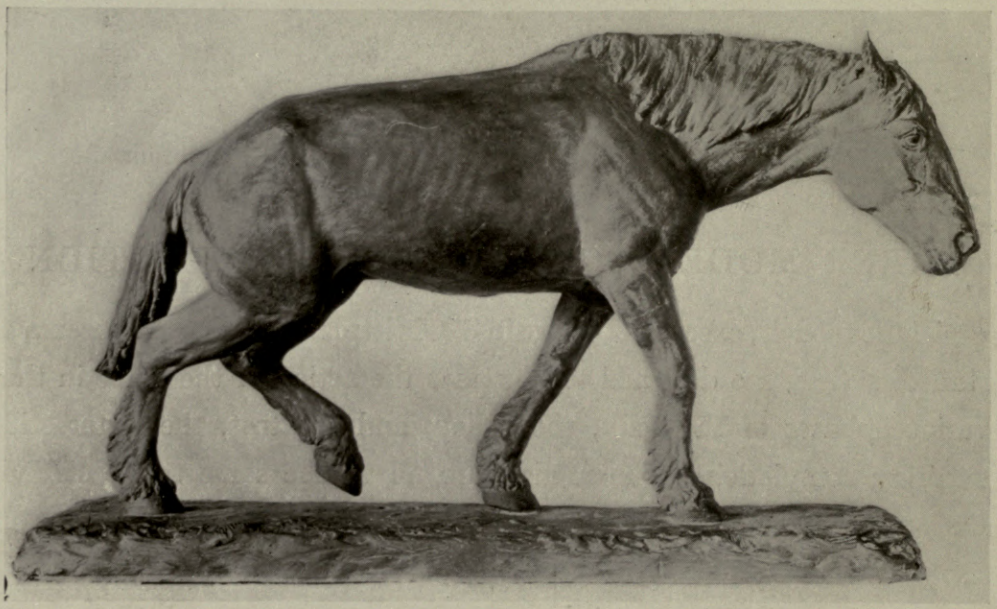
1. THE RACE HORSE "SYSONBY"

This model is designed upon an extremely careful study of the skeletal action and is based upon absolute measurements of the different limb segments. It represents one of the extreme phases of the run in which three of the limbs are folded and the fourth, in this case the right fore leg, has just left the ground. The artist was assisted by an instantaneous photograph of "Sysonby" and the former owner of this great racer, the late Mr. James R. Keene, pronounced the model an

absolute likeness of "Sysonby" as he appeared at his highest speed. It corrects several of the false traditions not only in regard to the limbs but also in regard to the position of the head, which is never extended out straight as represented in the old prints.

2. TWO PHASES OF THE GALLOP

In this representation of two phases of the gallop, by Mr. Erwin S. Christman, we have a study in which a more artistic effect is aimed at, yet the scientific anatomic purpose is served by the fact that the two horses represent what may be called the two extreme phases of the gallop, in one of which three of the limbs are folded up underneath the body, in the other of which three of the limbs are at their maximum extension beyond the perpendicular of the body.



3. THE DRAUGHT HORSE

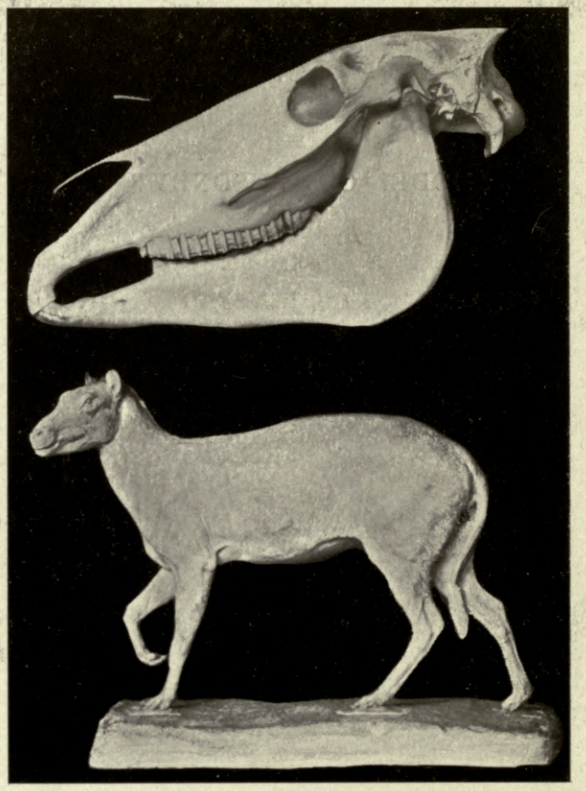
The draught horse similarly is a very careful study based upon the skeleton of the draught horse in action. It represents the opposite extreme of the "Sysonby" stride since three out of the four limbs are on the ground and the fourth, the left hind leg, is just being raised in the forward step. The head is extended forward as far as possible so as to balance the weight, because the horse is pushing and also leaning his entire weight against the collar so as to assist the muscles as much as possible.

MODEL OF "SYSONBY"

TWO PHASES OF THE GALLOP

THE FOSSIL SERIES

The horse from the very earliest geologic times, roughly estimated at two and a half million years, all the period since the birth of the Rocky Mountain system, has been the aristocrat among quadrupeds in point of speed and delicacy and beauty of construction. This statement is borne out by the comparison in the American Museum exhibitions of the little coursing hound, the whippet, and the original four-toed horse, in which the proportions of the different segments of the limbs are seen to be strikingly similar; in fact, the *Eohippus* probably had a little more speed, indicated in the elongate structure of its hind feet, than the whippet.

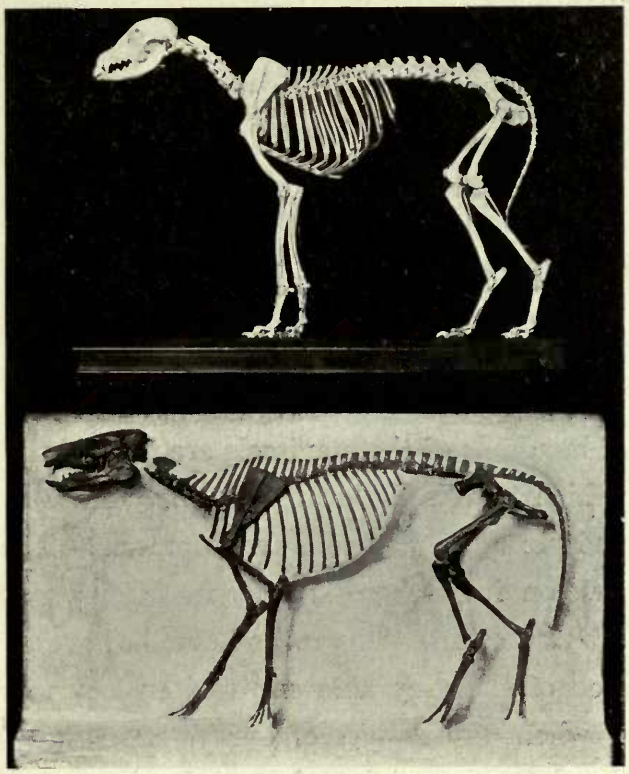


SKULL OF MODERN HORSE AND MODEL OF *EOHIPPUS*

It is very difficult to realize the multiple structure of the foot and the diminutive size of these very ancient horses until a life-size model of one is placed beside the skull of a modern draught horse, when it is

observed that *Eohippus* and the skull are of about the same length; also that one feature of equine evolution is a continuous increase in size.

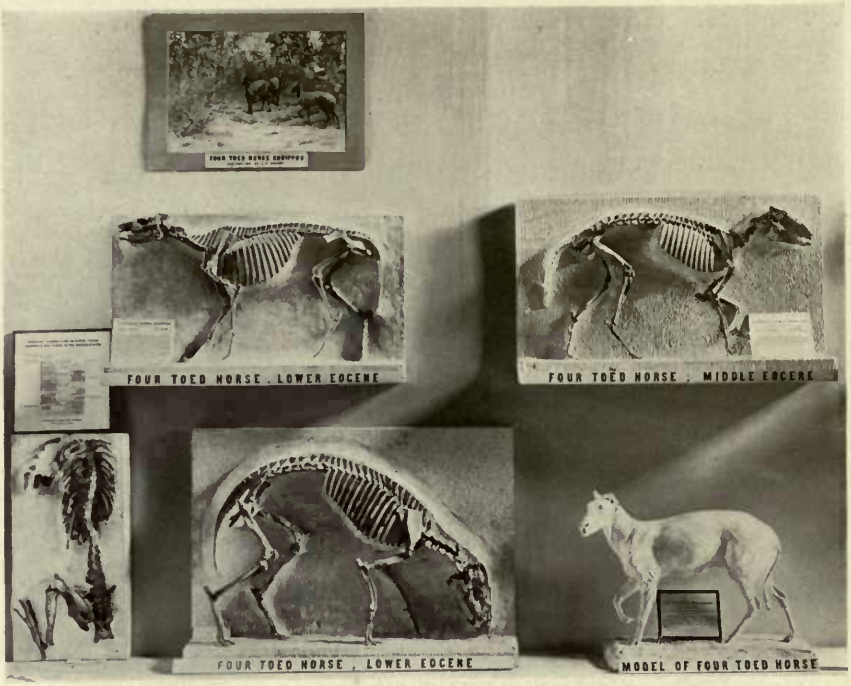
This principle of continuous increase in size is graphically displayed in the wonderful SERIES EOCENE TO OLIGOCENE representing the first five or six stages in the evolution of the horse, where ~~three~~ four principles are at once apparent: first, increase in size; second, increase in length and delicacy of limb; third, elongation of the limb below the knee joint and hock joint; fourth, disappearance of the outer hoofs, and concentration on the median hoof which now begins to rapidly increase in size.



SKELETONS OF WHIPPETT AND OF *EOHIPPUS*

These steps are wonderfully displayed in the series of horses beginning with *Eohippus* on the left and ending with *Mesohippus* on the right, representing a transformation which occupied perhaps a period of eight hundred thousand to one million years, through natural processes of breeding and the increasingly severe competition of these

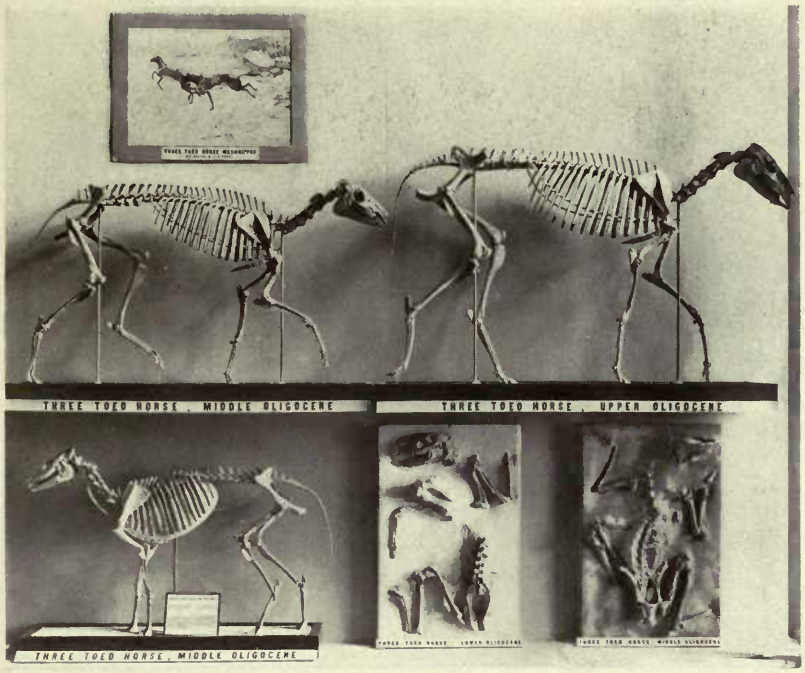
animals with many carnivorous enemies. The *Mesohippus* is already a superb mechanism, more delicate in its proportions than any modern race horse and probably equal in fleetness for short distances.



SERIES EOCENE TO OLIGOCENE

Remains of hundreds of these animals are found in the beds of old watercourses which traversed the region now politically divided into South Dakota, Nebraska, Colorado, and Montana. The recapture of a complete skeleton from these ancient watercourses and floodplain basins is a very rare event. The rocks have, however, yielded to the persistent search of the very able corps of explorers engaged in the work, most of whom are natives of our Western States. Especially we may mention James W. Gidley of South Dakota, who was in charge of the Whitney explorations for three years, and Barnum Brown of Kansas. Recently Mr. Walter Granger of Vermont has with great success taken up the search in the Rockies for the oldest American horses. These remains are generally found in a very fragmentary condition; they have been repaired and set up by Mr. Adam Hermann, head preparator, and his assistants.

Nature has produced even more distinct breeds than those produced by man, or rather greater extremes of structure and of habit. Thus very early in equine history among the race of *Mesohippus* the so-called FOREST HORSE appeared. These horses browsed on shrubs and soft plants rather than grazed, and seeking this kind of food in soft and swampy ground are distinguished by broad, spreading feet with three hoofs, and by short-crowned teeth resembling those of a tapir. These animals lived for hundreds of thousands of years and found their way even into western Asia.

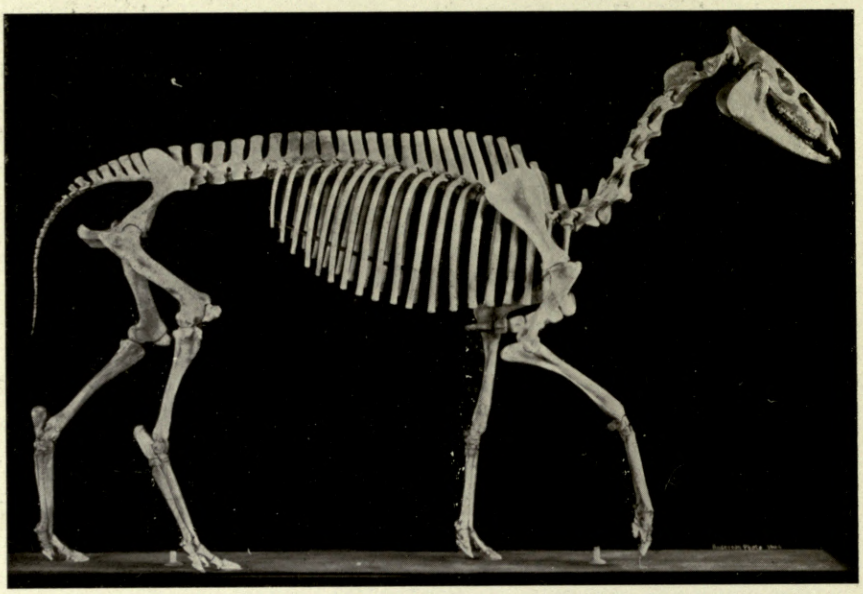


SERIES EOCENE TO OLIGOCENE

In the other extreme is the high speed mechanism of the grazing or DESERT HORSE which has limbs as finely drawn as those of the existing Virginia deer and was undoubtedly an animal capable of very high speed. This type is represented by *Neohipparion whitneyi*, or "Whitney's New Hipparion," the name having been given in honor of the late Mr. William C. Whitney. This is the most perfect skeleton of a fossil horse ever discovered, so perfect in preservation that even the cartilages of the ribs are fossilized and preserved as well as all the

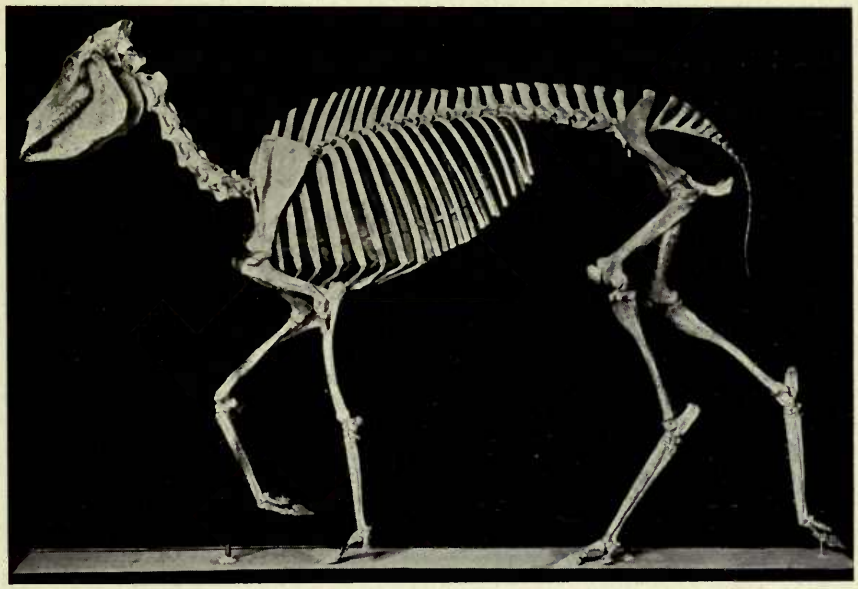
delicate vertebræ to the very tip of the tail. It was found near the Rosebud Indian Agency by Mr. H. F. Wells of the Whitney expedition sent out by the Museum in 1902, and was one of the finest products of the whole series of explorations conducted under this fund.

The skeleton is that of a mare, as indicated by the small size of the tusks. With the mare in the sandy deposit were found the skeletons



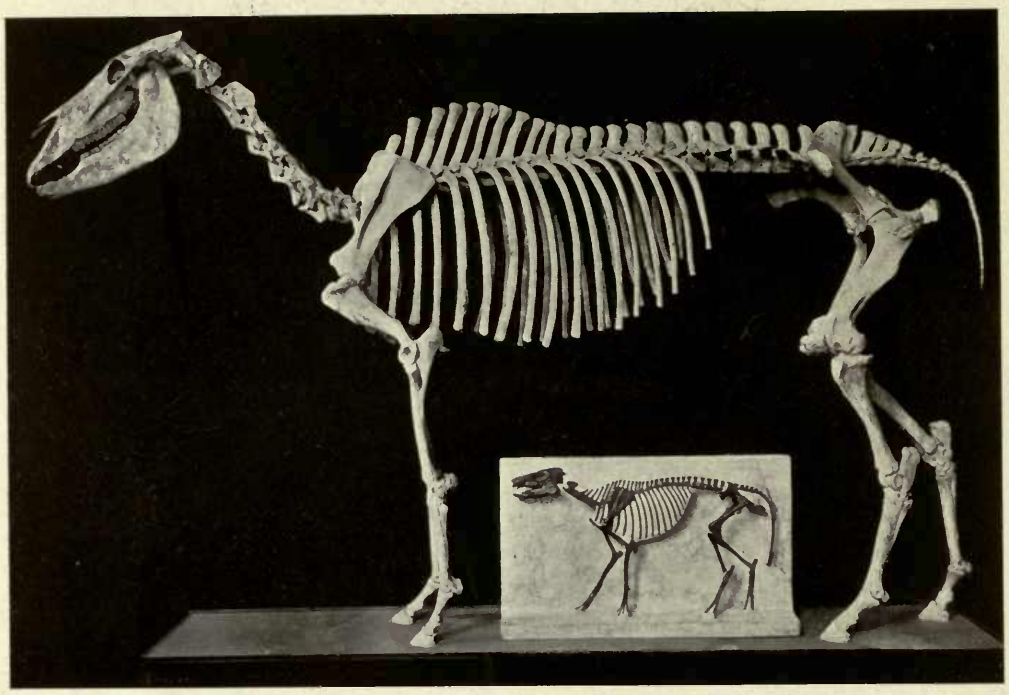
SKELETON AND RESTORATION OF THE FOREST HORSE
HYPOHIPPUS

of four younger animals, probably colts which had sought refuge from a sand or electric storm or cloudburst with the mare and were killed and buried at the same time. The head is exceptionally large, the teeth are long and highly effective for the grazing habit, while the limbs are excessively light and delicate in proportion.



SKELETON AND RESTORATION OF THE DESERT HORSE
NEOHIPPARION WHITNEYI

Neither of these types, the Forest, the Desert type, or the *Hipparion*, are known to be directly ancestral to the true modern horse *Equus*, and one of the gaps still remaining for our exploration is to discover the immediate ancestors of the true horse. It has long been known that wild horses of great variety covered our country long before the period of the Spaniards and probably long before the period of the first appearance of man. The natural causes of the extinction of these splendid native races are still unknown. Not improbably these animals were swept away by an epidemic.



EQUUS SCOTTI AND *EOHIPPUS*

First and last stages in the Evolution of the Horse in America

Up to the time of our exploration only fragments of these native horses had been found, together with a single fragmentary skull. Thus one of the most important discoveries made in the whole twenty-two years of exploration was the finding of remains of a herd of true horses near Rock Creek, Briscoe County, Texas, by James W. Gidley, of the Museum expedition of 1899. The herd consisted of seven skeletons,

most of which were nearly complete. Other skeletons have recently been found as a remnant of the same herd. No other such complete single find has ever been made in all the exploration, covering fifty years, of our Western States and Territories.

SIDE VIEW OF HOCK JOINT
Showing conversion of Lateral Toes into Splints

The animal known as Scott's horse or *Equus scotti,* represents the last stage in the evolution of the horse of North America just before it became extinct in this country. It is in every respect a horse, although a badly proportioned one, the head being large and the hip girdle short and clumsy. It differs from the domestic horse in the heavy, deep, zebra-like skull, compact body and smaller legs and feet. Like the modern horse it has only a single hoof on the fore and hind feet, while the side toes are represented by the "splints."

THE WILD HORSES, ASSES, ZEBRAS
IN THE
ZOOLOGICAL PARK

The presence of a great Zoological Park in New York, under the direction of the New York Zoological Society, will render possible in future years the completion of the HISTORY OF THE HORSE through the exhibition and study of all the wild living types.

A complete list of the wild equines now or very recently shown in the Park, and the principal geographic range of each, is as follows:

WILD HORSES.

PRZEWALSKY HORSES, *Equus przewalskii*. DESERT OF GOBI, CENTRAL ASIA.

WILD ASSES.

PERSIAN WILD ASS, *Equus hemippus*. DESERTS OF S. PERSIA, AND ARABIA.

KIANG, *Equus hemionus*. N. ASIA; TRANS-BAIKAL REGION.

ZEBRAS.

GREVY ZEBRA, *Equus grevyi*. ABYSSINIA AND BR. E. AFRICA.

GRANT'S ZEBRA, *Equus granti*. BRITISH EAST AFRICA.

CHAPMAN ZEBRA, *Equus burchelli chapmani*. CENTRAL SOUTH AFRICA.

MOUNTAIN ZEBRA, *Equus zebra*. CAPE COLONY, S. AFRICA.

The Przewalsky Wild Horse, otherwise known as the Steppe horse, and nearest relative of the domestic horse, is readily distinguished from all modern domesticated breeds by the entire absence of the forelock and by the fact that the mane rises along the neck like a crest exactly as in the zebras and asses, and does not fall over on one side, as in the domestic horse. The large head, rather short and truly horselike

ears, small and inexpressive eyes, and light buff-colored muzzle are well shown in Fig. 1. The body is uniformly colored, with a dark brown dorsal stripe. Sometimes there are faint horizontal stripings on the legs.

Another very distinctive feature, well shown in Fig. 1, is the short, stiff hair on the upper portion of the tail, of buff or dun color, traversed by the vertical stripe. There is a vast difference between the short, smooth and rather handsome coat of these animals in summer and the rough, shaggy coat of the winter, when a long beard appears beneath the jaws.

FIG. 1. HERD OF PRZEWALSKY WILD HORSES IN ZOOLOGICAL PARK
The original stallion and mare to the left. The small colt, born June 8, 1912, is of uniform buff color with a woolly coat. Photographed June 20, 1912

These animals were formerly widely spread over Europe, between twenty and twenty-five thousand years ago. During the Ice Age, they were among the favorite subjects of the cave men, who represented them with extraordinary fidelity as to all the features we have mentioned, on the walls of the caves of the Pyrenees, and of Dorgogne and northwestern Spain. Not one of these drawings shows a forelock,

and it is remarkable how those prehistoric artists portrayed the rather dull eyes in contrast with the fierce expression they gave the eyes of the bison.

The general dun or light-brownish color of the Przewalsky horses conforms to their semi-desert environment, rendering them less conspicuous, like the now extinct quagga of the Zebra family, which formerly

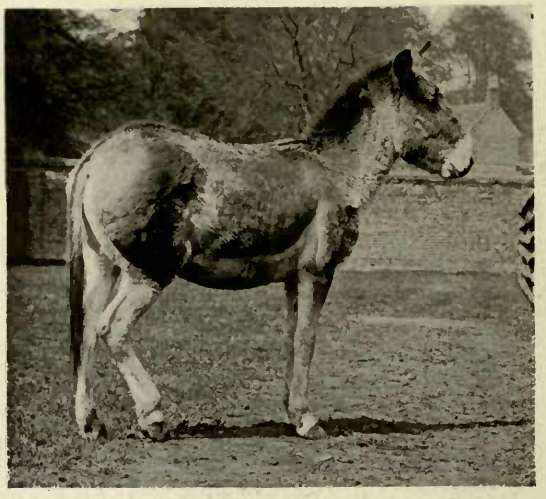


FIG. 2. THE KIANG, OR WILD ASS OF THIBET

From photograph by the Duchess of Bedford, made in Woburn Park

FIG. 3. THE PERSIAN WILD ASS

Equus hemippus

Uniform Isabella, or fawn-color, with dark dorsal stripe, light colored and slender limbs, light under color and dark erect mane. This animal differs from the Abyssinian ass, the progenitor of the domesticated asses, in the absence of the shoulder stripes.

roamed the open plains south of the Limpopo River in the Transvaal, South Africa.

But the closest imitation of the wild horse is in the wild ass (Fig. 2) from the Trans-Baikal of Asia, known as the *Kiang*, a specimen of which was presented to the Society by His Grace the Duke of Bedford. The light under-color of the belly of the wild horse is also seen in the wild ass of Southern Asia (Fig. 3) which has a much lighter color scheme than that of the Przewalsky. Its limbs are also light instead of being dark. It shows, too, the dark,

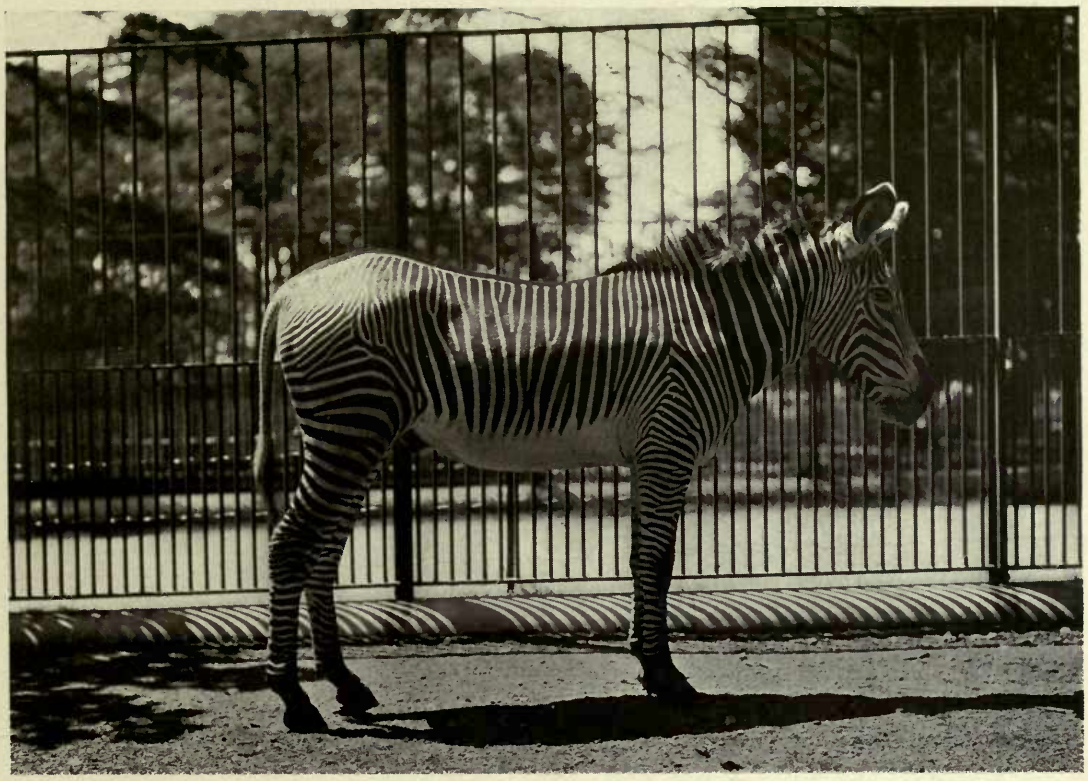


FIG. 4. THE PRINCE OF THE ZEBRA FAMILY, *Equus grevyi*
From photograph by Sanborn, in the Zoological Park

erect mane and black stripe down the back. In fact, this black stripe down the back so well shown also in the back view of the Grevy Zebra (Fig. 5), is the most universal of all the color markings in the family of horses.

It is difficult to conjecture what advantage this dark brown or black line brings to the animal. In all the accompanying photographs it appears to shade off into the background.

The very brilliant dark-brown stripes of the Grevy zebra, shown in Fig. 4, certainly tend to make the animal very conspicuous as seen in its yard; but from certain points of view, such as that of Fig. 4, where the sunshine glances off the glistening hair, the white and brown stripes on certain regions of the body entirely disappear. Those who strongly believe in the color protection theory truly point out that in certain surroundings this most brilliantly marked of all the mammalia almost

disappears from human vision. I myself have seen a small herd of Grevy Zebras standing under a tree in the Duke of Bedford's Park, Woburn Abbey, with the sunshine glistening down on them against a light background, become almost invisible. The vanishing effect is only transitory, however, and from other points of view they again become conspicuous.

The Grevy is readily distinguished as the largest of the zebras. It is characterized by delicate striping, a very long head, and very large, rounded ears, like those of many other forest-loving animals. Its narrow striping contrasts very strongly with the broad and brilliant stripes of the Grant zebra, which, as shown in Fig. 6, so completely surround the body that they unite with a black line extending along the under surface of the belly. Grant's zebra, like the Grevy, has a very conspicuous set of horizontal stripes extending down the legs to the hoofs, and is thus readily distinguished from the Chapman zebra in which the lower portion of the leg is quite pale.

FIG. 5. THE GREVY ZEBRA, FROM ABYSSINIA

Distinguished by sharply defined and very numerous narrow white and dark chocolate stripes, and by a very heavy dorsal stripe which is continued down the center of the tail.

The Grant Zebra is typical of a very large group entirely distinct from the Grevy and Mountain zebras. It is broadly known as the Burchell group, the type of which was the zebra found and described by the English explorer Burchell north of the Orange River, which roamed north of that stream as the Quagga roamed to the south. In the typical Burchell zebra (*E. burchelli*, now believed to be almost extinct)

FIG. 6. THE ACCLIMATIZATION OF THE GRANT ZEBRA, *Equus granti*

Mare, and foal born July 17, 1911. The mare shows the black muzzle, diamond-shaped pattern of the star on the forehead, black, erect mane, which extends back into the thin dorsal stripe and broad gridiron over the hips. The slender limbs of the zebra colt have nearly the same length as the limbs of the mother, although the body is very much shorter. This enables the colt to keep pace with its mother in escaping the attacks of the lion, the chief enemy of the Grant zebra.

From photograph by Sanborn, in the Zoological Park

the entire legs are devoid of stripes, so that the zebras of the Burchell group from the Grant zebra on the extreme north of British East Africa to the extinct Quagga of the Cape of Good Hope region, once presented a complete color transition from the universal striping in the North to striping confined to the shoulders and anterior portion of the trunk in the Quagga of the South. This fading out of the stripes, which affords a color transition between these brilliantly marked animals and the apparently monotonous color of the Przewalsky horse, affords strong ground for believing that all the horses were originally

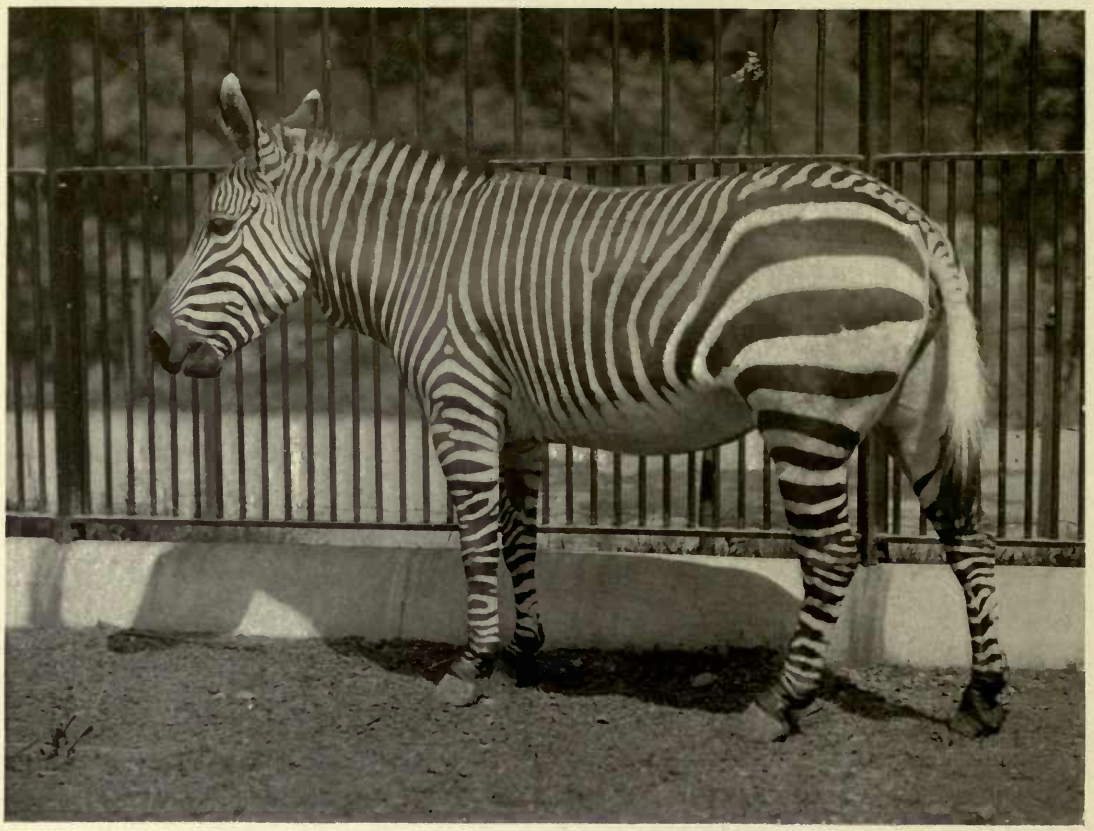


FIG. 7. THE EXTREMELY RARE MOUNTAIN ZEBRA, *Equus zebra*

striped. This belief is strengthened by the fact that reversional striping occurs in all the dun colored horses on the face, the limbs, and the shoulders, while the medium back stripe is found in the duns, bays and browns among the horses.

The *Mountain Zebra* (Fig. 7) is the rarest animal in our entire collection, because it is now extinct throughout a large part of its former range and is carefully protected by the South African government in its remaining mountain fastnesses. Like the Grant zebra, its color bands are very broad and comparatively few in number, but it possesses a broad gridiron of transverse stripes over the hips, which is only partially developed in the Grant. Other characteristic features are its short head, very long ears, the distinct lap or loose fold in the under

skin of the neck, and the very short, heavily-built limbs which adapt it to its mountain habitat.

The call of the Mountain Zebra is between that of the horse and the ass, and usually consists of three short, barking whinnies in quick succession. The note is uttered with great gusto, and the position assumed during the call is more like that of a horse than of the ass, which while braying stands quietly with the head up and the ears pricked forward. The disposition of the Mountain Zebra is generally vicious, whereas the Grant zebra is much more docile and capable of domestication.

It is interesting to note that although the zebras were well known to the Romans, this true or Mountain Zebra was the first of this group to be described by Linnaeus, as *Equus zebra*, from the figure in Edward's "Gleanings of Natural History." The Grevy zebra on the other hand, occupying the heart of Abyssinia, was the last of this great group to be discovered, not having been made known to science until 1882, when a specimen was presented to President Grevy of the French Republic, in whose honor the new species was named.

FINIS